ADHESION OF MEMS MICROCANTILEVERS

M. P. de Boer and R. A. Plass

Sandia National Laboratories, Albuquerque, NM 87185

Reliability Physics Department,

We describe recent and ongoing experimental studies on adhesion of MEMS microcantilevers. Very low adhesion is desired. By coating the surfaces with silane coupling agents and by nanoscale roughening of the surfaces, we achieve values of microjoules per square meter. Capillary condensation is then avoided, and adhesion is limited to van der Waals forces. One challenge is to maintain such low values in humid and thermal environments, where coupling-agent restructuring may allow microcapillary bridging between the surfaces, causing the adhesion to increase. We have demonstrated that coatings can survive several days at 100% relative humidity without adhesion degradation. Another challenge is to develop and model baseline data on the effects of humidity of uncoated surfaces as a function of surface roughness. We have constructed a clean chamber using ultra high vacuum methodologies, and are conducting experiments that we will report on.